

AD-A133 376

TRADOC RAM (RELIABILITY AVAILABILITY MAINTAINABILITY)

1/1

DATA EVALUATION SYS. (U) AMERICAN POWER JET CO

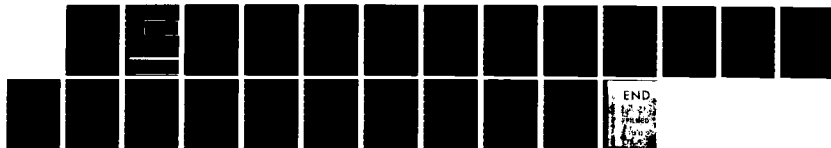
RIDGEFIELD NJ G CHERNOWITZ ET AL. 05 FEB 82

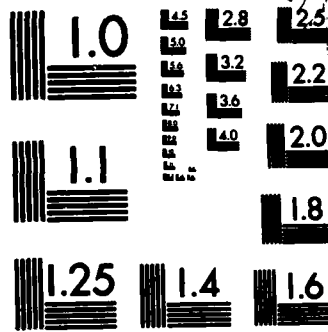
UNCLASSIFIED

APJ-892-5-PT-2 DAAK21-81-C-0034

F/G 5/2

NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

FINAL REPORT  
TRADOC RAM DATA EVALUATION SYSTEM (TRADES)  
(ACN 51235)

PART II: STUDY WORK PLAN

APJ 892-5



DTIC  
ELECTE  
OCT 11 1983  
S D

APJ 892-5

FINAL REPORT  
TRADOC RAM DATA EVALUATION SYSTEM (TRADES)  
(ACN 51235)

---

PART II: STUDY WORK PLAN

UNDER

CONTRACT NO. DAAK21-81-C-0034

FOR

RAM ENGINEERING AND ASSESSMENT BRANCH  
RAM/ILS DIVISION  
MATERIEL SYSTEMS DIRECTORATE  
U.S. ARMY LOGISTICS CENTER  
FORT LEE, VIRGINIA 23801

BY

AMERICAN POWER JET COMPANY

ARLINGTON, VA.  
(703) 920-8030

FORT LEE, VA.  
(804) 734-2360

RIDGEFIELD, N.J.  
(201) 945-8203

FEBRUARY 1982

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER APJ 892-5 ✓	2. GOVT ACCESSION NO. <b>AD-A133 376</b>	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) TRADOC RAM Data Evaluation System (TRADES)		5. TYPE OF REPORT & PERIOD COVERED Concept Development, Final Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) G. Chernowitz, J. Ciccotti, J. Arnold, R. Yoshikawa		8. CONTRACT OR GRANT NUMBER(s) DAAK21-81-C-0034
9. PERFORMING ORGANIZATION NAME AND ADDRESS American Power Jet Company 705 Grand Avenue Ridgefield, N.J. 07657		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 00910 Logistics 011700 Operations Research
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Logistics Center Materiel Systems Directorate (ATCL-MRS) Fort Lee, Va. 23801		12. REPORT DATE 5 February 1982
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)  Same as Item 11.		15. SECURITY CLASS. (of this report)  Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A
16. DISTRIBUTION STATEMENT (of this Report)  Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)  Unlimited distribution.		
18. SUPPLEMENTARY NOTES This report was accomplished under the Army Study Program, TRADOC ACN 51235.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)  RAM, Reliability, Availability, Maintainability, Automation, Systems Development, System Acquisition, R&M		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  The TRADES final report provides an innovative concept for the collection, evaluation, storage, and dissemination of reliability, availability, and maintainability data to satisfy TRADOC requirements. The five part study recommends an automated system that enables the TRADOC combat developer to access RAM information from appropriate data sources. Combat and materiel developers need such a system to utilize and draw maximum actionable inferences from existing and future data bases. —> call		

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

Part I: Executive Summary. Includes the highlights of the study effort, detailing the background which led to the study, the essential areas of analysis, alternatives developed, study conclusions and recommendations.

Part II: Study Work Plan (SWP). The SWP outlines the objectives of the TRADES concept development, the purpose, assumptions, scope, essential elements of analysis, time schedule, and resources required for the study.

Part III: System Requirements Description (SRD). The SRD presents the functional requirements for the TRADES system developed using basic source documents, questionnaires, and dialogue established with data users, data proponents, and data sources.

Part IV: Alternative Concepts of Operation (ACO). The ACO explains the five ACOs which were developed and includes a comparative evaluation of these alternatives along with the recommendation to use the U.S. Army Logistics Center Planning Factors Data Base (PFDB) mini-computer.

Part V: System Technical Paper (STP). The STP documents the data system concept which includes the overall concept of operation, internal and external procedures, hardware and software requirements, and personnel implications. This report also recommends that TRADES capitalize on the currently available and programmed hardware within TRADOC, which significantly reduces implementation costs and time.

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A	



UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

NOTICE

VIEWS, OPINIONS, AND/OR FINDINGS CONTAINED IN THIS REPORT ARE THOSE OF THE AUTHOR(S) AND SHOULD NOT BE CONSTRUED AS AN OFFICIAL DEPARTMENT OF THE ARMY POSITION, POLICY, OR DECISION UNLESS SO DESIGNATED BY OTHER DOCUMENTATION.

## FOREWORD

This report entitled "TRADOC RAM Data Evaluation System (TRADES)" is an American Power Jet Company (APJ) study effort issued in five parts:

- Part I: Executive Summary and Brief
- Part II: Study Work Plan (This Report)
- Part III: System Requirements Description
- Part IV: Alternative Concepts of Operation
- Part V: System Technical Paper

This Part of the final report presents the proposed Study Work Plan (SWP), outlines the objective of the APJ program, key assumptions, scope, essential elements of analysis, and time schedule that governed the entire effort.

A draft version was submitted as APJ 892-1, and presented to the SAG. Their comments and recommendations are incorporated herein and are gratefully acknowledged.



## TABLE OF CONTENTS

<u>CHAPTER</u>	<u>TITLE</u>	<u>PAGE</u>
I	INTRODUCTION.....	1-1
	System Title.....	1-1
	Background.....	1-1
	Purpose.....	1-2
II	OBJECTIVES.....	2-1
	General.....	2-1
	Task 1 - Study Work Plan (SWP).....	2-1
	Task 2 - RAM System Requirements Description (SRD).....	2-1
	Task 3 - Alternative Concepts of Operation (ACO).....	2-2
	Task 4 - System Technical Paper (STP).	2-2
	Task 5 - Final Study Report (FSR)....	2-2
III	SCOPE.....	3-1
IV	LIMITS.....	4-1
V	ASSUMPTIONS.....	5-1
VI	ESSENTIAL ELEMENTS OF ANALYSIS.....	6-1
VII	TASK LIST.....	7-1
VIII	TIME SCHEDULE.....	8-1
IX	MANPOWER REQUIREMENTS.....	9-1
X	RESOURCES.....	10-1
	GLOSSARY.....	G-1

## ILLUSTRATION

<u>CHAPTER</u>	<u>TITLE</u>	<u>PAGE</u>
8-1	TRADES Milestone Schedule.....	8-2

## CHAPTER I

### INTRODUCTION

#### SYSTEM TITLE

The system concept and development under study in this program is identified as the TRADOC RAM Data Evaluation System (TRADES) (ACN 51235): Phase II. For convenience, it is identified as TRADES in this report.

#### BACKGROUND

The TRADOC combat development and operational testing communities have a requirement for reliability, availability, and maintainability (RAM) data during all phases of the life cycle of equipment under its cognizance. During concept definition, it is necessary to establish specifications and requirements which are goals for the materiel system. During test and evaluation, there is a need to establish whether the equipment has met its expectations. During the remainder of materiel life cycle, surveillance must be maintained to insure that the equipment retains its operational capabilities.

At present, RAM data are not available in a single, unified system. Additionally, the TRADOC combat development and operational testing communities have no easy access to RAM data. Certain systems under development may provide data elements which would provide certain inputs applicable to RAM. Other existing data sources, such as the DARCOM

Sample Data Collection System, TAMMS, and TECOM test reports provide isolated and often limited elements of data relative to RAM.

Inasmuch as many of these data elements are representative of wide differences in environmental conditions, life cycle stage of the equipment, and depth of detail of data, such information must be rendered complete and consistent with regard to TRADOC requirements.

Accordingly, the TRADOC community has a requirement for an in-house data system from which TRADOC and its proponents can access raw engineering, test, and field RAM data which can be readily utilized to provide selected RAM data to support the user mission in materiel development and operational force development testing.

#### PURPOSE

The purpose of this study program is to develop and document viable and realistic alternative concepts of operation (ACO) that will provide TRADOC and its proponents with a system which can collect, analyze, validate, store, retrieve, process and disseminate RAM data using units of measure and methods of presentation compatible with their requirements.

This study program will further develop and document a data system for the alternative concept of operation selected by United States Army Logistics Center (USALOGC), which will include consideration of the overall concept of operation, internal and external operating characteristics, hardware and software requirements, and personnel implications.

## CHAPTER II

### OBJECTIVES

#### GENERAL

The overall objectives of this program are set forth in Chapter I, Purpose. The total effort will be organized into five major task areas:

Task 1: Study Work Plan (SWP)

Task 2: RAM System Requirements Description (SRD)

Task 3: Alternative Concepts of Operation (ACO)

Task 4: System Technical Paper (STP)

Task 5: Final Study Report (FSR).

#### TASK 1 - STUDY WORK PLAN (SWP)

The principal objective of this task is to develop a detailed SWP for accomplishing the objectives of the program.

When approved by USALOGC, the study plan (the present document) will be used as the principal guide to the accomplishment of the total effort.

#### TASK 2 - RAM SYSTEM REQUIREMENTS DESCRIPTION (SRD)

The principal objective of this task is to provide for the total data collection effort as it relates to:

1. RAM data requirements of TRADOC and its proponents
2. RAM (or comparable) data available from selected sources
3. Characteristics and detailed data (to the extent required for this program) on existing or planned interfacing data systems.

4. Documentation of RAM data requirements for the proposed system.

The results of this task will provide all data requirements to satisfy Tasks 3, 4, and 5 below.

**TASK 3 - ALTERNATIVE CONCEPTS  
OF OPERATION (ACO)**

The principal objective of this task is to develop and document viable and realistic ACOs, each of which will satisfy the TRADOC community's RAM requirements. The results of this task will provide the basis for the selection of the TRADES ACO by TRADOC which will be further developed and documented in Task 4 below.

**TASK 4 - SYSTEM TECHNICAL  
PAPER (STP)**

Task 4 is concerned with the development and documentation of the ACO selected by USALOGC, and will be identified as TRADES. The results of this task will include the overall concept of operation, operating characteristics, software requirements, and resource implications. Flow charts of automated processes will be included.

**TASK 5 - FINAL STUDY REPORT (FSR)**

This task will provide TRADOC with a final study report (including a short executive summary) which will incorporate TRADOC recommended revisions to the results of the first four tasks discussed above.

## CHAPTER III

### SCOPE

The scope of this program is to:

1. Identify TRADOC user requirements and RAM data sources
2. Establish Essential Elements of Information (EEI) for the TRADES
3. Examine ACOs to include Maintenance Task Demand (MTD) and Planning Factors Data Base (PFDB)
4. Develop the approved TRADES (ACO) concepts
5. Document the STP.

The EEI will be selected on the basis of user requirements (both in content and units of measure) in adequate detail for review, deletion or expansion by the TRADOC COTR. The ACO will be detailed to the degree necessary for evaluation by the TRADOC COTR for selection of the concept to be developed as TRADES.

The TRADES final report will include flow-charting and resource requirements of the approved system.

The scope and content of attachments to DAAK21-81-C-0034 will be followed in each task performance.

CHAPTER IV  
LIMITS

The following establishes the bounds which will be placed on the study program for development of the TRADES concept. It is considered that the bounds are sufficiently broad to insure a comprehensive and viable product, and yet provide limits to the areas of investigation.

A. Users to be considered will be selected in coordination with the USALOGC COTR from:

1. HQ TRADOC, Ft. Monroe, Virginia
2. TRADOC Integrating Centers
  - a. LOGCEN
  - b. Combined Arms Center
  - c. Soldier Support Center
3. TRADOC Centers and Schools
4. TRADOC Test and Evaluation Activities
5. Academy of Health Sciences
6. Selected DA activities which can use RAM data in the form developed for TRADOC.

B. RAM sources to be selected in coordination with the USALOGC COTR. Consideration will be given to:

1. HQ DARCOM
2. DARCOM Development & Readiness Commands
3. DARCOM Project and Program Managers
4. Materiel Readiness & Support Activity (MRSA)
5. Test and Evaluation Command (TECOM)
6. Army Logistics Management Systems Activity (ALMSA)
7. Army Materiel Systems Analysis Agency (AMSAA)

8. Operational Test and Evaluation Agency (OTEA)
9. DA Field Activities (e.g., Fort Hood units)
10. DA Staff Activities (e.g., DCSLOG, LEA)
11. Other activities where RAM data might be available.

C. Systems to be considered for interoperability with TRADES are limited to:

1. MTD
2. PFDB
3. USALOGC ADPE requirements
4. LSAR (DARCOM)
5. Sample Data Collection System (DARCOM)
6. TAMMS
7. TAERS (historical base)
8. TECOM test reports
9. INFONET (OTEA)
10. CTDCS
11. SAMS
12. Materiel Test Reports - U.S. Army generated
13. Hard copy data base currently in existence.

D. TRADES system concept will address commodity areas and major systems of interest to TRADOC.

E. Equipment to be considered from both the user's standpoint and data sources will be limited to equipment of interest to TRADOC.



CHAPTER V  
ASSUMPTIONS

The following essential assumptions are applicable to the TRADES concept development:

1. TRADOC has a requirement for RAM data at all stages of materiel system life cycle
2. The scope and detail of stated requirements for RAM data by TRADOC proponents will be assumed to be complete and accurate
3. The stated scope and availability, and accuracy of RAM data provided from potential sources are complete and accurate
4. The MTD and PFDB are viable systems that will be implemented
5. The USALOGC Automatic Data Processing Equipment (ADPE) Requirements Study will incorporate the requirements to support the TRADES selected system.
6. The USALOGC COTR will provide necessary visit clearances, need-to-know, and points of contact to all user and data source activities in a timely manner
7. The USALOGC COTR will provide for distribution of a visit agendum and/or questionnaire with a required suspense date consistent with the program milestone requirements.

## CHAPTER VI

### ESSENTIAL ELEMENTS OF ANALYSIS

The following listing sets forth the Essential Elements of Analysis (EEA) which will be used to evaluate alternative concepts of TRADES operation and to define the recommended system. It also defines the considerations which will be embodied in the selected concept of operation and embodied in the System Technical Paper.

1. Responsiveness to user requirements (availability, scope, and time)
2. Accessibility to proponents
3. EEI
4. Flexibility (batch vs interactive)
5. Resource (manpower, initial and operating cost, facilities and equipment) requirements
6. Integration with other data base systems
7. Backup capability
8. Growth potential
9. Quality control - input data edit/validity checks
10. Security of software and data base.

It is noted that the criteria are all applicable to the ACO, and analysis of the selected system.

## CHAPTER VII

### TASK LIST

A complete listing and description of tasks considered necessary to perform the objectives of this program are set forth in Chapter II above as related to the program objectives.

Task sequencing and planned resources allocation are set forth in Figure 8-1, below.

## CHAPTER VIII

### TIME SCHEDULE

The TRADES milestone schedule is presented in Figure 8-1. This milestone chart indicates dates of initiation and completion of each task, dates of submission of task reports, Study Advisory Group (SAG) meetings, sponsor decision points, and final completion date, coordinated with the COTR.

It will be noted that the time scheduling of Task 2 (SRD) has been extended 30 days beyond that specified in the Contract Data Requirements List (CDRL). This additional 30-day requirement is considered necessary to insure completeness of the SRD, inasmuch as it will provide the principal driving force to the ACOs. It will also provide an additional 30 days in the required due date of input from all sources.

The alternative would be to significantly restrict the sources, and require a due date of all source input of 50 days after initiation of the effort. This extension will not impact timing of other tasks since the principal efforts in Task 3 (ACO) will be performed in parallel, even under the current milestone chart.

The study program has a start date of 3 March 1981, with final report completion 5 February 1982, as jointly agreed to by the COTR and APJ. This schedule provides time required for Government review of task products prior to scheduled SAG meetings.

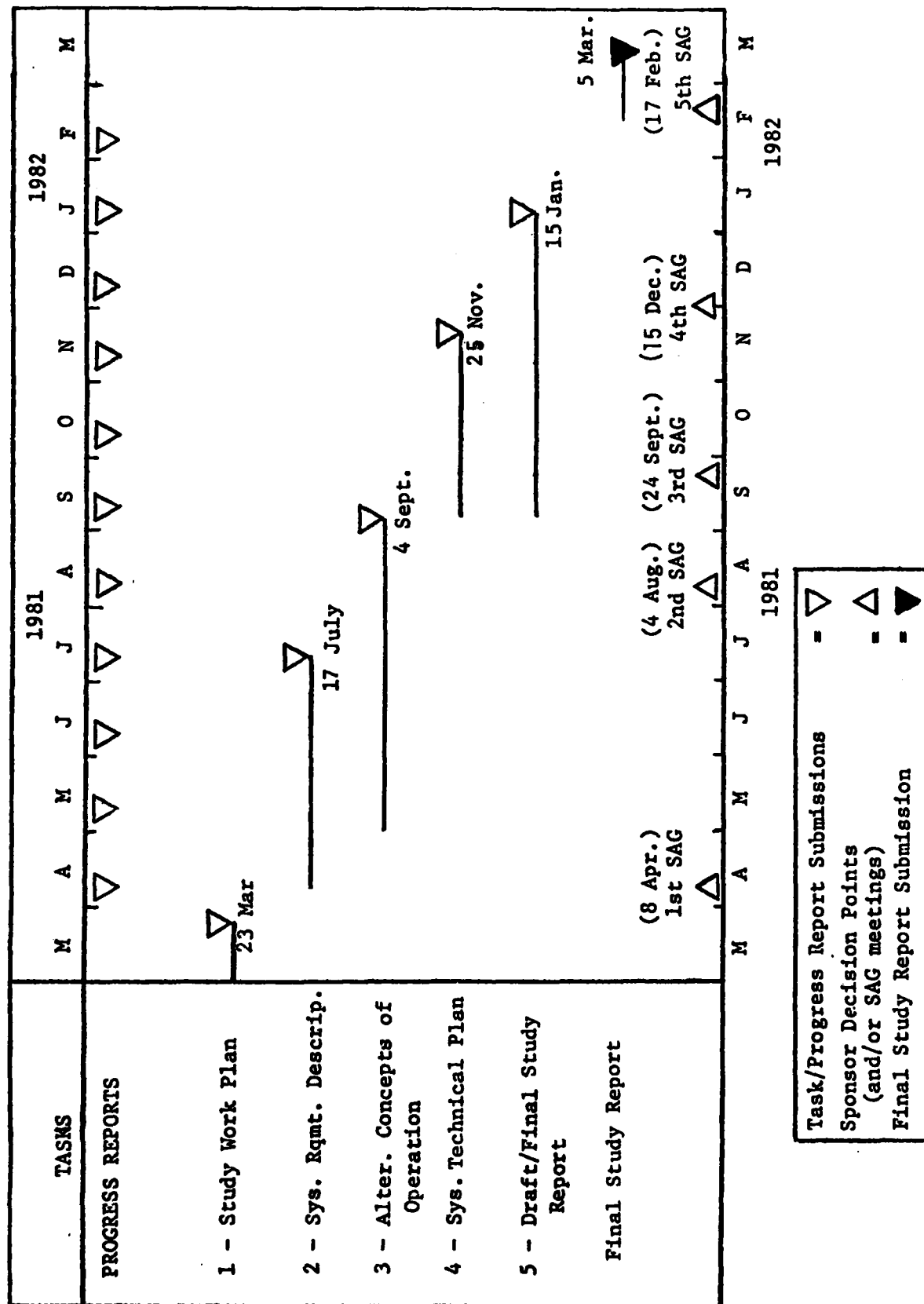


Figure 8-1. TRADES Milestone Schedule

CHAPTER IX  
MANPOWER REQUIREMENTS

Time phase projections of manpower requirements are included in Chapter VIII (Figure 8-1) as they relate to each of the tasks in Chapters II and VII.

## CHAPTER X

### RESOURCES

The time phase plan for expenditure of contract funds parallels the time phasing of manhour expenditures presented in Figure 8-1.

Travel funds other than those to Washington, D.C. and Ft. Lee, Virginia will be expended predominantly in Task 2. Limited amount of travel funds will be reserved for Tasks 3 and 4 to cover a contingency requiring revisit of user or data sources which may arise.

## GLOSSARY

ACO	Alternate Concepts of Operation
ADPE	Automatic Data Processing Equipment
CDRL	Contract Data Requirements List
EEA	Essential Elements of Analysis
EEI	Essential Elements of Information
FSR	Final Study Report
MTD	Maintenance Task Demand
PFDB	Planning Factors Data Base
RAM	Reliability, Availability and Maintainability
SAG	Study Advisory Group
SRD	Systems Requirements Description
STP	System Technical Paper
SWP	Study Work Plan
TRADES	TRADOC RAM Data Evaluation System
USALOGC	United States Army Logistics Center



END

FILMED

10-83

DTIC